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### **A modern materialist approach to abstraction, concreteness and explanation in cognition**

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## Commentary on Gilead, Trope & Liberman

Abstract: 43 words. Main text: 801 words. References: 38 words. Entire text (1000 words)

A modern materialist approach to abstraction, concreteness and explanation in cognition.

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*While endorsing the authors' concentration on the issue of abstraction, I critique (a) the philosophical nature of their abstract-concrete dimension, (b) their view of the brain-world barrier, and (c) their implicit positivist one-way hierarchy that has abstraction as the goal.*

We cannot make a statement or an experimental manipulation without abstracting. So Gilead et al.'s focus on abstraction is welcome. As is their replacing the old empiricist individual—passively waiting to interpret incoming data—with the predicting subject. However, much remains of the old positivism. Explanatory theorizing in cognitive science is best served by a modern materialist approach with a fuller picture of abstraction and of *universals*.

The authors posit entities that are exclusively one kind of universal. They are all 'abstract universals'. For materialists 'abstract' means 'sparsely connected' and 'concrete' means 'densely/widely connected'. It is a continuum, in a monist worldview. An abstract universal (e.g. 'verb', 'script', 'episode') captures that which is similar between many entities. Beyond that similarity, it is relatively contentless. Reliance solely on abstract universals entails describing and redefining *ordered relations* between such entities. It necessarily leads to endless notational variants, as the authors' review shows, and eventually to each abstract universal being defeated by new data. Nevertheless, such universals provide a necessary initial traction on a domain. They may play a later theoretical role in conjunction with a second type of universal.

A *concrete universal* (the term is originally from Hegel, but cf. Vico's 'imaginative universal', Goethe's 'Ur-phänomen', Vygotsky's 'unit of analysis') is something *material* that speaks to and mediates everything else in the domain being studied (Shillcock, 2014). Unifying other entities is the classic definition of a universal. Further, it behaves in a way that characterizes the whole domain. (Indeed, it is one approach to defining a domain.) It is the explanatory essence that provides us with the best understanding of the totality of the domain. For example, in explaining how cells come together to create the domain of bodily anatomy, the *stem cell* would be the relevant concrete universal: it is a cell like other cells but—given the necessary conditions—leads us to the

totality of the domain. What might be the relevant entity in cognition, from neuron to hemisphere, from orienting reflex to spoken word? One approach to identifying it is to critique Gilead et al.'s definition of the domain.

The authors make the world-brain barrier a key division by proposing a hierarchy from the sensorium 'up' to increasingly far removed and less specific mental entities. These 'topmost' entities are still immaterial abstract universals; in deep learning such topmost entities might successfully label a picture, but that is a long way from the productive agency that characterizes human cognition. There is a suspicion that a homunculus is lurking at the top.

The authors' ontology reveals the conventional positivist notion of stepwise building up, from supposedly assumptionless 'atomic' foundations, verifying each move, until the highest processing is achieved. The human central nervous system certainly contains hierarchical visual processing close to the sensorium, as the authors note, but it is also characterized by enormous recurrency (with predictive processing and the incorporation of material artefacts being the most sophisticated aspects). In this sense, the authors tell a conventional story concerning the relationship between the single subject's brain and the objective outside world.

Philosophers have long claimed that people have 'precipitated out' the results of cognition and that these real-world artefacts are legitimate components of cognition. We can see such 'tools' in the outside world—machines, locomotives, words. We can also talk about 'tools' *inside* the brain (but not as 'tools all the way down', which makes 'tool' a less than useful abstract universal).

A materialist analysis develops all of these arguments to claim that the *hemisphere* is the relevant concrete universal in the domain of wider cognition (Shillcock, Thomas & Bailes, 2019). A single hemisphere is substantially capable of doing anything that a whole brain can do—its activities characterize the whole domain of the cognizing brain. Every aspect of cognition is affected by the hemispheric divide, given the extensive lateralization and specialization of function unique to the human brain. An enormously productive dialectic emerges between the 'two brains in one cranium' sharing the same world, and finessing any need for a homunculus. Each hemisphere is productively predicting and modelling the other, effectively using the other as a tool. Such mutual modelling ensures a unity of conscious experience.

As a second example, the foetus/infant responds to *speech* as an 'abstract' (sparsely connected) material entity. Speech constituents are internalized by a variety of actions, small and large-scale. Over time, they become more 'concrete', more densely connected with each other and with different activities. Specifically for English, we might trace the life of the schwa-sound (itself a word—'a'—and a paralinguistic gesture) within each of the subdomains of language behaviour (phonology, syllabicity, syntax, semantics...) as a promising concrete universal that allows speakers to negotiate between old and new information, which is the fundamental nature of spoken communication.

Selecting a candidate concrete universal in no way excludes us from researching the characteristic activities of any other entity, large or small. It might lead us to clarify the structure of a larger or

smaller domain, with its own characteristic processing. A concrete universal provides us with the deepest joint at which to carve nature, to reveal the essential ‘logic’ of the behaviour of the domain. An explanatory theory requires us to be able to move dialectically between a relatively simple material element playing the critical role in the domain—the hemisphere, the schwa-sound, in our examples—and the *totality* of the moving, acting cognitive agent, the goal being to return our theorizing to that latter totality.

Shillcock, R. (2014). The concrete universal and cognitive science. *Axiomathes*, 24(1), 63-80.

Shillcock, R., Thomas, J., & Bailes, R. (2019). Mirror neurons, prediction and hemispheric coordination: the prioritizing of intersubjectivity over ‘intrasubjectivity’. *Axiomathes*, 29(2), 139-153.